



PATENT

ADJUSTABLE LIGHT ASSEMBLY FOR A MOTORCYCLE

FIELD OF THE INVENTION

This invention relates to improvements in light assemblies, and more particularly to improvements in light assemblies used in motor vehicles such as motorcycles.

BACKGROUND OF THE INVENTION

Light assemblies mounted on motorcycles are generally fixed in place so as to be properly aligned to provide a light beam to illuminate a desired area in front of the motorcycle when the motorcycle is generally vertically aligned with the ground. However, motorcycles lean with respect to the ground as they make left and right turns. This can cause the light assembly to either shine light down into the ground before the desired area or up into the air beyond the desired area. This last condition is particularly problematic when there is fog or smoke, as light shining into such fog can be reflected back to the driver of the motorcycle, causing undesirable glare and interfering with the view of the driver.

Some attempts have been made to compensate for the tilting of the light beam caused by tilting of a vehicle. U.S. Patent 5,599,085 to Tabata et al discloses a motorcycle headlight which is adjustable in response to tilting of the motorcycle. A

1 sensor senses a change of position of the motorcycle and sends a signal to one or
2 more solenoids to adjust the position of the headlight with respect to the vehicle to
3 compensate for vehicle tilting. However, Tabata et al is a relatively complex and
4 expensive mechanism, and has not seen significant commercial use. U.S. Patent
5 4,075,469 to Alphen et al discloses a motorcycle lighting system wherein a
6 gyroscope adjusts an optical system to compensate for the angle of inclination of the
7 motorcycle as it turns. However, Alphen et al, and the other known designs have
8 relatively complex and expensive mechanisms, and has not seen significant
9 commercial use.

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11 U.S. Patent 1,593,075 to Hensley discloses a headlight system for
12 locomotives where a headlight is connected to a pendulum by a bevel gear so that
13 as the locomotive turns around a bend the pendulum pivots with gravity and urges
14 the headlight to pivot about an axis vertical with respect to the vehicle.

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16 It would be highly desirable to have a low cost, easy to construct light
17 assembly for a motorcycle which compensates for the lean of the motorcycle as it
18 turns.

19 20 SUMMARY OF THE INVENTION

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22 In accordance with a first aspect, an adjustable light assembly comprises a
23 light and an attachment bracket adapted to secure the light to the vehicle. As the

1 vehicle leans the light pivots directly in response to the pull of gravity in a direction
2 opposite the lean of the vehicle.

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4 From the foregoing disclosure and the following more detailed description of
5 various preferred embodiments it will be apparent to those skilled in the art that the
6 present invention provides a significant advance in the technology of adjustable light
7 assemblies. Particularly significant in this regard is the potential the invention
8 affords for providing a high quality, low cost adjustable light assembly. Additional
9 features and advantages of various preferred embodiments will be better understood
10 in view of the detailed description provided below.

11 12 BRIEF DESCRIPTION OF THE DRAWINGS

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14 Fig. 1 is a view of a light assembly attached to a motorcycle in accordance
15 with a preferred embodiment.

16 Figs. 2A-2C are views of the motorcycle with left and right light assemblies
17 shown in three positions: Left Turn (Fig. 2A); Straight Riding (Fig. 2B); and Right
18 Turn (Fig. 2C); showing that the light assemblies stay generally aligned with the pull
19 of gravity as the motorcycle leans in either direction.

20 Fig. 3 is an exploded perspective view of the preferred embodiment of the
21 light assembly shown in Fig. 1.

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1 It should be understood that the appended drawings are not necessarily to
2 scale, presenting a somewhat simplified representation of various preferred features
3 illustrative of the basic principles of the invention. The specific design features of
4 the light assembly as disclosed here, including, for example, the specific dimensions
5 of the bearings, will be determined in part by the particular intended application and
6 use environment. Certain features of the illustrated embodiments have been
7 enlarged or distorted relative to others to enhance visualization and clear
8 understanding. In particular, thin features may be thickened, for example, for clarity
9 of illustration. All references to direction and position, unless otherwise indicated,
10 refer to the orientation illustrated in the drawings.

11 12 DETAILED DESCRIPTION OF CERTAIN PREFERRED EMBODIMENTS

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14 It will be apparent to those skilled in the art, that is, to those who have
15 knowledge or experience in this area of technology, that many uses and design
16 variations are possible for the light assembly disclosed here. The following detailed
17 discussion of various alternative and preferred features and embodiments will
18 illustrate the general principles of the invention with reference to a light assembly
19 particularly suitable for use as a fog light for a motorcycle. Such a light assembly
20 can provide night-visibility augmentation with nominal intervention. Other
21 embodiments suitable for other applications will be apparent to those skilled in the
22 art given the benefit of this disclosure.

1 Referring now to the drawings, Fig. 1 shows a motorcycle 10 with left and
2 right light assemblies 12. The light assemblies 12 project a beam of light out to a
3 desired area in front of the motorcycle to enhance the view of a driver. The light
4 assemblies can act as fog lamps in that they preferably have a vertical cut off
5 design, reducing light scattering and glare by partially preventing light from shining
6 upwards, and by choice of frequency of light emitted by the light assembly.

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8 Once a motorcycle leans, as it normally does to make a turn a fixed light
9 assembly (i.e., a light assembly that is normally fixed in place with respect to the
10 motorcycle) will either shine light down into the ground or up into the air. In
11 accordance with a highly advantageous feature, the light assemblies used herein
12 pivot directly in response to the pull of gravity. Figs. 2A-2C show the motorcycle 10
13 and the light assemblies 12. In Fig. 2A, the motorcycle is turning to the left and in
14 response the light assemblies pivot about an axis horizontal to the motorcycle so as
15 to stay in generally the same position with respect to the ground as they are when
16 the motorcycle is vertically aligned (as seen in Fig. 2B). Similarly, in Fig. 2C, the
17 motorcycle is turning to the right and leaning toward the right, and the light
18 assemblies pivot directly in response to gravity so as to stay in the same alignment
19 with the ground as in Fig. 2B. Thus, if the vehicle leans 5 degrees from vertical, the
20 light assemblies, responding to the pull of gravity, each pivot in a direction generally
21 opposite and equal to the lean of the vehicle. This adjustability provides an elegant,
22 low cost technique for keeping the light assemblies from pointing into the ground or

up into the air and eliminates the need for relatively expensive additional alignment equipment such as sensors, solenoids, gyroscopes, etc.

Fig. 3 discloses a preferred embodiment of an adjustable light assembly 12. Light 14 (preferably a vertical cut off light) is mounted on an attachment bracket 18. The attachment bracket may be C-shaped and the light is mounted between a pair of side flanges 98. The attachment bracket and the light are rotatable together with a bolt 20. In the preferred embodiment shown in Fig. 3, a connector 26 is elbow shaped to allow for ease of connection to the motorcycle, and has an opening sized to receive a bearing assembly 22 and the bolt 20. It will be readily apparent to those skilled in the art that other connector shapes, such as a straight connector, may be used depending upon the desired location of the light. The bearing assembly 22 is provided between the bolt 20 and the connector 26. Preferably the bearing assembly comprises a cylindrical bearing with an internal diameter 28 which bears against the bolt 20 and an external diameter 27 which bears against the connector 26. The external diameter is held fixed to the connector 26 by welding, adhesive, crimping of the end of the connector, etc and the bolt is free to rotate with respect to the bearing and the connector within the internal diameter. This construction captivates the bolt with respect to the vehicle, but permits rotation of the bolt and light with respect to the connector.

Preferably the bolt 20 is threaded and receives three pairs of nuts 24 and washers 25. A first nut/washer pair 24, 25 is positioned on the bolt 20 between the

1 bearing assembly 22 and the head 99 of the bolt 20. A second nut/washer pair 24,
2 25 is positioned on the bolt 20 between the bearing assembly and the attachment
3 bracket 18. As the bearing is held in place by attachment to the connector 26, the
4 first two pairs of nuts and washers serve to hold the relative linear position of the
5 bearing with respect to the bolt. The third nut/washer pair 24, 25, shown in the lower
6 left in Fig. 3, is positioned on the bolt and secures the light 14 and attachment
7 bracket 18 to the bolt. This third nut/washer pair rotatably captivates the light 14 and
8 attachment bracket 18, permitting the light to pivot with the bolt 20 and cooperating
9 with the bearing assembly to resist dislocation of the light from the connector. Thus,
10 the bolt, light and bracket are rotatably captivated to the connector in that these
11 components are free to rotate with respect to the connector but are prevented from
12 linear dislocation by connection to the bearing assembly.

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14 Optionally as shown in the drawings, the bolt may have an opening which
15 allows wiring to run from the vehicle to the light 14. Alternatively, the bolt may be
16 solid, and the wiring providing electricity to the light assembly may be mounted
17 separate from the bolt. Other techniques for running the wiring to the light will be
18 readily apparent to those skilled in the art given the benefit of this disclosure.

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20 From the foregoing disclosure and detailed description of certain preferred
21 embodiments, it will be apparent that various modifications, additions and other
22 alternative embodiments are possible without departing from the true scope and
23 spirit of the invention. For example, In addition to enhancing forward vision and

1 visibility, light assemblies as disclosed herein may also offer enhanced rear visibility.
2 Low visibility conditions, such as those produced by fog, smoke, or other ambiently-
3 suspended particles, can increase the likelihood of highway collisions because of
4 reduced visibility of vehicles moving along the same path. Vehicle manufacturers
5 have attempted to enhance rear vehicle visibility by enabling the operator to
6 selectively increase the luminosity of the left rear taillight, and thereby increase the
7 detectability of a leading vehicle by a following vehicle. However, the output of such
8 an "enhanced" taillights is necessarily limited because light scattering may dazzle or
9 otherwise impair the vision of the following driver. Adjustable light assemblies as
10 disclosed herein may optionally be combined with a red-spectrum fog lamp with a
11 precise vertical cut-off, reducing light scattering above the horizon of vision of the
12 following driver and extending the rearward visibility of the leading vehicle for a much
13 greater distance than current enhanced taillights. Moreover, by reducing light
14 scattering above the horizon vision, greater wattage than fixed light assemblies may
15 be used, advantageously increasing illumination.

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17 The embodiments discussed were chosen and described to provide the best
18 illustration of the principles of the invention and its practical application to thereby
19 enable one of ordinary skill in the art to use the invention in various embodiments
20 and with various modifications as are suited to the particular use contemplated. All
21 such modifications and variations are within the scope of the invention as
22 determined by the appended claims when interpreted in accordance with the breadth
23 to which they are fairly, legally, and equitably entitled.